

NATIONAL LIBRARY OF MEDICINE

Building on our Vision & Roadmap for the 3rd Century

MLA | SLA '23
May 19, 2023



National Library of Medicine
Library Operations



Amanda J. Wilson

Deputy Associate Director,
Library Operations



The National Library of Medicine

The World's Largest Biomedical Library AND Research Enterprise for Biomedical Informatics



Agenda

- **Introduction – Amanda Wilson**
- **Updates from NIH and NLM – Dianne Babski**
- **Updates from NNLM – Martha Meacham**
- **Discussion – Amanda Wilson**



slido Polls

Results are *anonymous* and will be shown in *real time*!

Step 1
Use phone camera to read QR code
or
Go to [Slido.com](https://www.slido.com)
Enter **#1424606**



Join at
slido.com
#1424 606

How much funding was awarded to communities last year?

\$1,332,896

0%

\$783,369

0%

\$971,248

0%

Step 2
Click on 'Polls'

Q&A

Polls

How much funding was awarded to communities last year?

0

\$1,332,896

\$783,369

\$971,248

Step 3
Enter a response

Send

Voting as Anonymous

Step 4
Click 'Send'

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NLM is one of the five U.S. national libraries (A national library is one that is established by federal legislation). What are the other four?

ⓘ Start presenting to display the poll results on this slide.



Dianne Babski

Associate Director,
Library Operations



A Message from Dr. Brennan



What is the National Library of Medicine?

World's
largest
biomedical
library



1 of 27
Institutes
of NIH

Serving Science and Society Since 1836

Research Enterprise for Biomedical Informatics and the World's Largest Biomedical Library



1836-1967

A Collection of Books and Journals

NLM began in the office of the United States Army Surgeon General until Congressional authorization moved NLM to the Public Health Service. NLM opened its doors on the NIH Campus in Bethesda, MD in 1965.



1968-2000

Foundation of a Modern Library

Expansion and impact in the Information Age

- Lister Hill National Center for Biomedical Communications
- National Center for Biotechnology Information
- National Information Center on Health Services Research and Health Care Technology (NICHSR)



2001-2036

The 21st Century Library

Lead innovative research to accelerate the mission of the NIH and reach scientists and society with trustable health information.



Personnel updates





Patti Brennan



Dianne Babski



Olivier Bodenreider



Todd Danielson



Valerie Florance



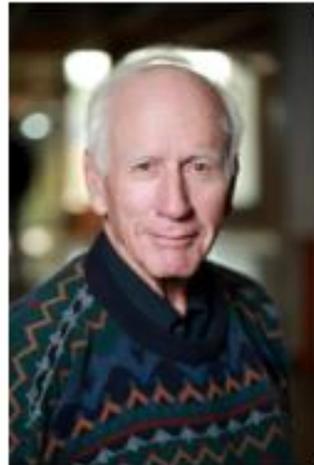
Lisa Federer



Wei Ma



Mike Huerta



Clem McDonald



Richard Palmer



Jerry Sheehan



Steve Sherry

NLM Staff Announcements



Mike Huerta,
Acting Deputy
Director for
Operations and
Innovation



Lisa Federer,
Acting Director of
Strategic Initiatives

Retirements & Departures



David Gilligan
(Retirement)
Library
Operations



Lisa Lang
(Retirement)
Library
Operations



Jerry Sheehan
(Departure)
Deputy Director,
Policy and External
Affairs

Nominee for
the NIH
Director



Dr. Monica Bertagnolli
Director, National Cancer Institute



Advice and Guidance from the Library Community



JONATHAN ELDREDGE, PHD
Health Sciences Library &
Informatics Center,
University of New Mexico



KRISTI HOLMES, PHD
*Galter Health Sciences
Library, Northwestern
University*



MARY MAZANEC, JD, MD
Library of Congress



PHILIP WALKER, MS, OTH
*Annette & Irwin Eskind
Family Biomedical Library &
Learning Center, Vanderbilt
University*



PAUL WESTER, MLS
*National Agricultural
Library*

NLM Associate Fellows 2022 - 2023



Mya Ballin



Carlette Dennis



Leah Everitt



Ellen Thieme



Kelly West

ALA/MLA/NLM Spectrum Scholars 2022 - 2023

DEV WILDER

University of Washington

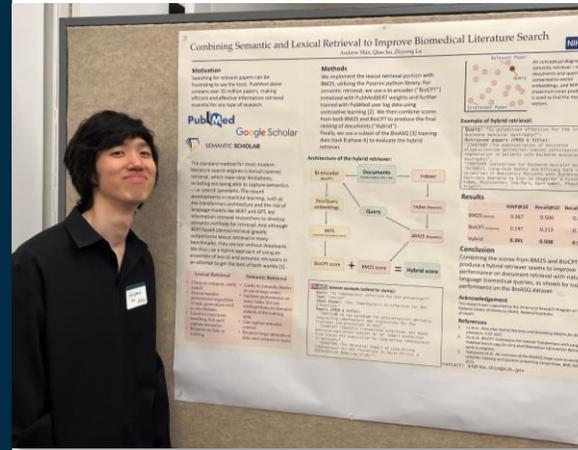
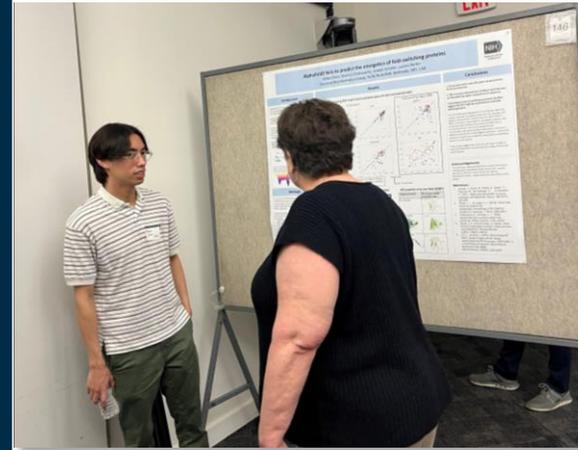
RISELL YUEN

University of British Columbia



NLM Intramural Trainees

Welcoming 55 summer interns, including nine participants in the NLM Data Science and Informatics Scholars Program





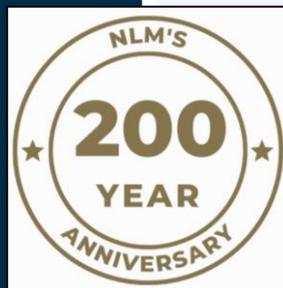
Strategic Plans & Vision



Vision

Our mission, and our federal mandate, is to **collect, preserve, and disseminate** biomedical information, and that will not change.

LO envisions a future in which data and information will continue to **transform and accelerate biomedical discovery** and improve health and health care globally.

The background of the right side of the slide features a collage of circular images. At the top right, there's a hexagonal pattern with icons like a globe and a document. Below it, a circle contains a gear icon. Another circle shows a person's hand pointing at a screen. A larger circle at the bottom left shows a person's arm reaching out. A circle at the bottom right shows the spines of books. The text "2036 Long Range Plan Library Operations" is overlaid on this collage.

2036 Long Range Plan Library Operations

November 2021



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Three years ago we created a framework to help describe our work when we were trying to help new staff on-board in a large organization in a remote world. We refer to this as the 3Cs. What do the 3Cs stand for?

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Library Operations – What We Do

Collect

Acquire and preserve unique and trusted collection of biomedical information



Curate

Make biomedical information findable through data normalization, metadata and data standards

Connect

Link our global audience to biomedical data and resources to make informed health decisions

5 LRP Goals

1

**Create a
Modernized
Organizational
Structure**



2

**Unify and
Transform NLM
Collections**



3

**Support and
Promote the Use
of Health Data
Standards &
Terminologies**



4

**Provide
Customer Design
Experience
Support**



5

**Know and
Equitably Engage
our Users**



Diverse Stakeholders

Our stakeholders are found in public and private sectors, across America and the world.



Challenges in Information Management

- Evolving user expectations (digital access, one-stop-shop, etc.)
- Accelerated pace of change (technology, science, etc.)
- Increased health misinformation
- Diversity, equity, inclusion, accessibility (DEIA)
- Government bureaucracy



Near-term Vision: “Amazon-like User Experience”



Seamless and expansive
knowledge-seeking experience
for users in their time of need...



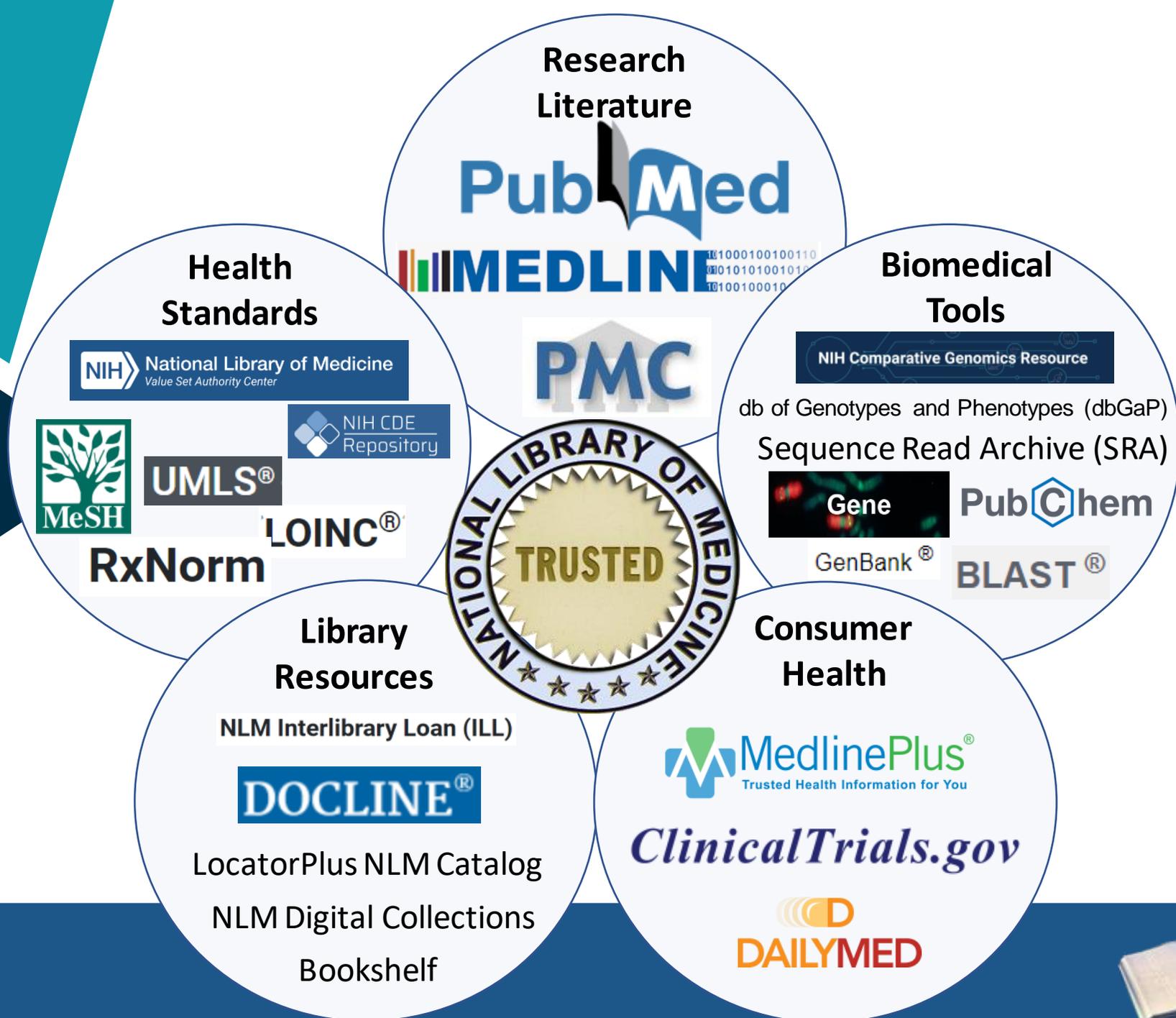
...driven by the NLM data
ecosystem working intelligently
behind the scenes to deliver
NLM products and services.



Product & Service Updates



Connecting Everyone with Health Information



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What is the most popular reason for visiting DailyMed?

ⓘ Start presenting to display the poll results on this slide.



User-Driven Website Updates

NIH National Library of Medicine
National Center for Biotechnology Information

PMC PubMed Central® Search PMC Full-Text Archive Search in PMC Advanced Search User Guide

Journal List > Sci Adv > v.7(32):2021 Aug > PMC8336949

4 As a library, NLM provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health. [Learn more about our disclaimer.](#)

ScienceAdvances | AAAS
SIGNIFICANT RESEARCH. GLOBAL IMPACT

Sci Adv. 2021 Aug; 7(32): eabj1691. PMID: PMC8336949
Published online 2021 Aug 4. doi: [10.1126/sciadv.abj1691](https://doi.org/10.1126/sciadv.abj1691) PMID: [34348905](https://pubmed.ncbi.nlm.nih.gov/34348905/)

Self-assembling synthetic nanoadjuvant scaffolds cross-link B cell receptors and represent new platform technology for therapeutic antibody production

Sujata Senapati,¹ Ross J. Darling,² Kathleen A. Ross,^{1,3} Michael J. Wannemuehler,^{2,3} Balaji Narasimhan,^{1,3,*} and Surya K. Mallapragada^{1,3,*}

1 Cite 2 Collections 3 RESOURCES

Similar articles +
Cited by other articles +
Links to NCBI Databases +

UPDATED FEATURES

- 1) “Cite” button provides formatted citation information
- 2) “Collection” button adds the article to My NCBI collections
- 3) “Resources” section presents related articles and information

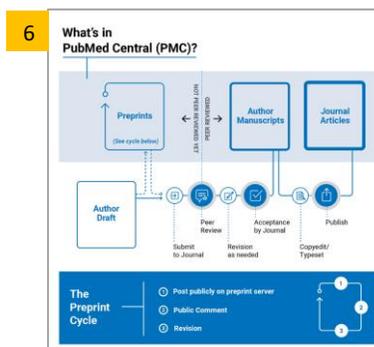
NEW CONTEXTUAL INFORMATION

- 4) Information panel to clarify the relationship of NLM to the articles it archives in PMC
- 5) Disclaimer language on Facebook and Twitter when a PMC article is shared
- 6) Infographic helping to illustrate what types of content are in PMC

5

As a library, the National Library of Medicine (NLM) provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health.

PMC PubMed Central®



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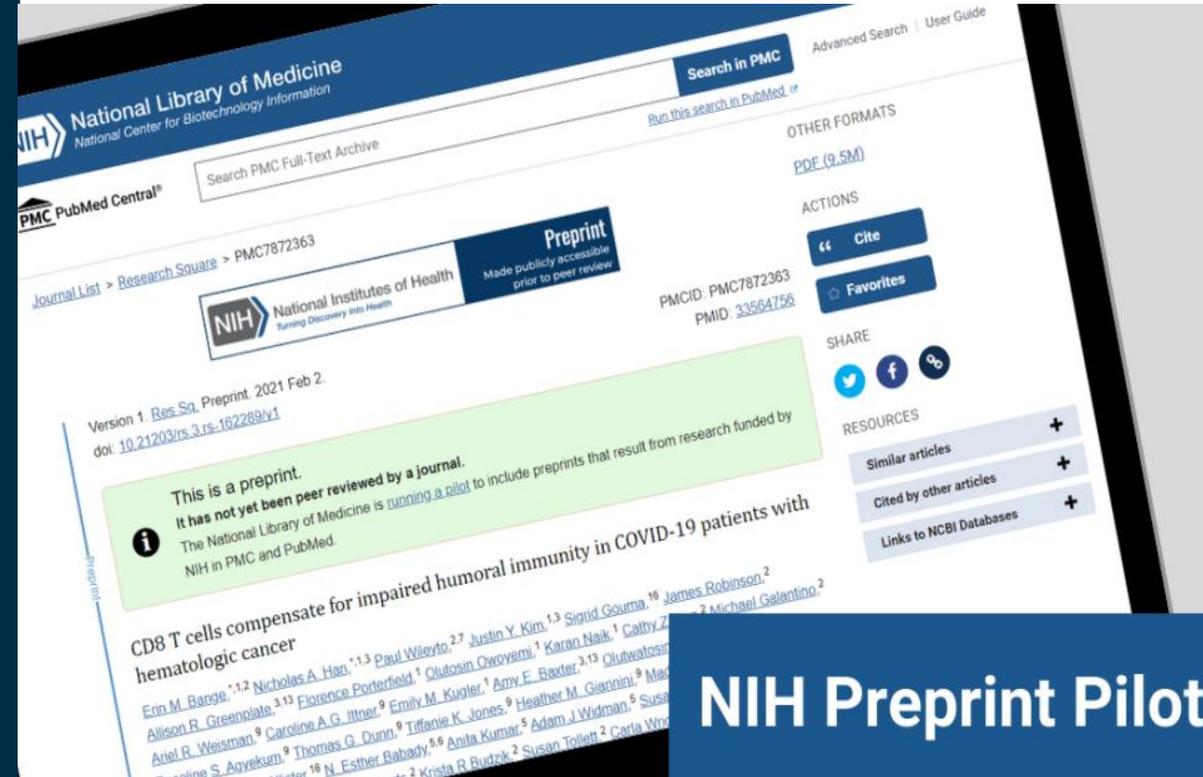


What PubMed tools use machine learning to improve search results?

ⓘ Start presenting to display the poll results on this slide.

NIH Preprint Pilot, Phase 2

- Expanded pilot in January 2023 to all preprints that acknowledge NIH support posted to bioRxiv, medRxiv, arXiv, and Research Square on or after Jan. 1, 2023
- Prior to expansion, updates were made to preprint presentation, search, and documentation
- New preprints continue to be added to PMC and PubMed on a weekly basis throughout 2023
- Phase 2 has doubled the number of preprint records in PMC and PubMed



NIH Preprint Pilot

ClinicalTrials.gov Modernization Overview



YEAR 1

Initial Engagement Activities

- Engaged stakeholders to determine and validate approach and specifications
- Enhanced internal business processes
- Developed modernization roadmap



YEAR 2

Development

- Developed new product experiences
- Launched first release of ClinicalTrials.gov Beta
- Communicated availability of the beta release to stakeholders



YEAR 3

Implementation

- Launched first release of PRS Beta and released updates
- Conducted usability research and made iterative improvements to the beta sites
- Released updates to ClinicalTrials.gov Beta



Where we are now

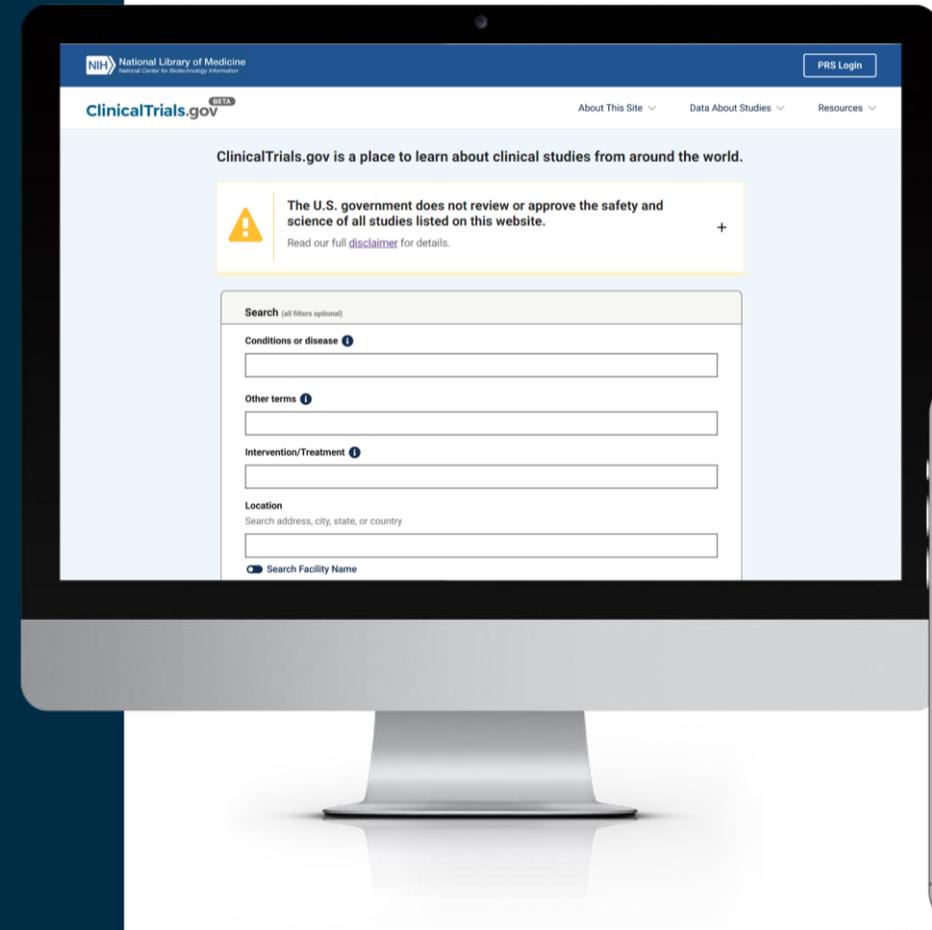
YEARS 4–5

More Releases and Refinements

- Continue releasing updates and refinements to the beta sites until they can stand alone
- Continue engagement, usability testing, and evaluation
- Make ClinicalTrials.gov Beta the primary landing page
- Release PRS Beta protocol registration and results reporting components

ClinicalTrials.gov Beta Plan for 2023–24

- **Currently** available at beta.clinicaltrials.gov
- **In June**, it will be the primary website!
- **In 2023**, the classic site will remain available. (Will be retired sometime in 2024)
- **Throughout 2023 and into 2024**, remaining features and feedback will be incorporated into the new website.



ClinicalTrials.gov



NLM ILL FY22 Statistics

77,374
Total
Requests
Received

61.2%
Filled
from E-
licensed
content

38.6%
Filled
from
Print

- Back to full service in September of 2022
- Oldest article filled was published in 1832
- Average turnaround time for print: 52.7 hours
- Average turnaround time for electronic: 12.9 hours



DOCLINE Update

Over
2,400
active
users

288
requests
per
workday
hour

Nearly
600K
items
requested

Average
of **1.28**
routes to
fill

Fill rate of
93%
across
the system

- Search for articles with PubMed Search
- Search for articles with DOI
- Request 10 PMIDs at a time
- Request for Books
- Auto Registration for New Libraries and Users



Enhancement List: www.nlm.nih.gov/doctype/support/releases.html

What's New in MeSH and Indexing

- YEP processing and nine MeSH 2023 Update reports
- More than 150 changes to MeSH terminology in progress for 2024
- Merged Indexing Management System functionality into the PubMed Data Management to support full indexing automation and chemical and gene curation





Humans in the Loop

Trust but Verify!

Humans-in-the-Loop (HITL)

A practice of uniting human and machine intelligence to create a continuous feedback loop that allows the algorithm to produce better results.

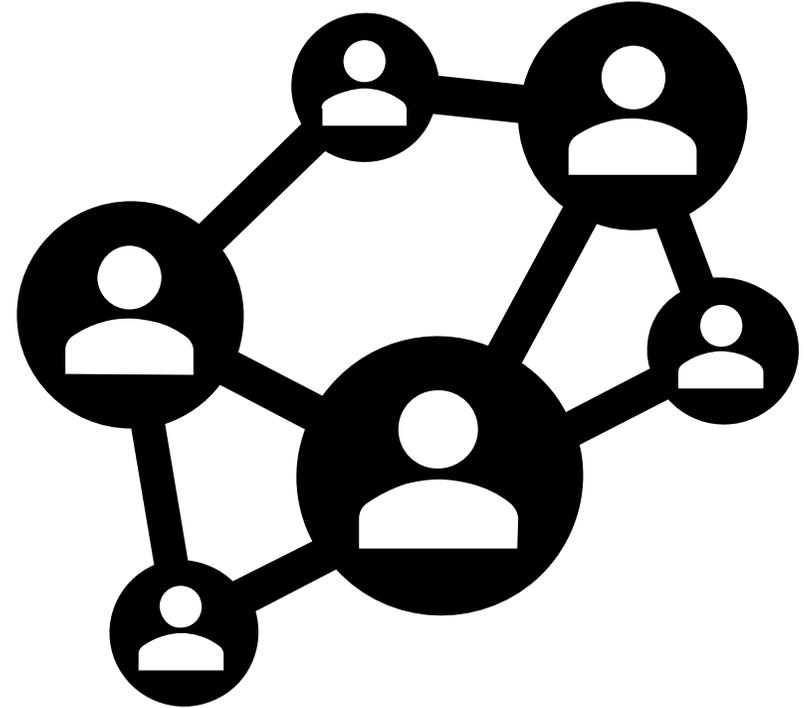
AI Alignment

Research that aims to steer AI systems towards humans' intended goals, preferences, or ethical principles. An AI system is considered "aligned" if it advances the intended objectives.



NLM Office Hours

- Every other month
- Real-time answers
- Recordings at learn.nlm.nih.gov
- Announced in *NLM Technical Bulletin*



Upcoming in June: MedlinePlus!

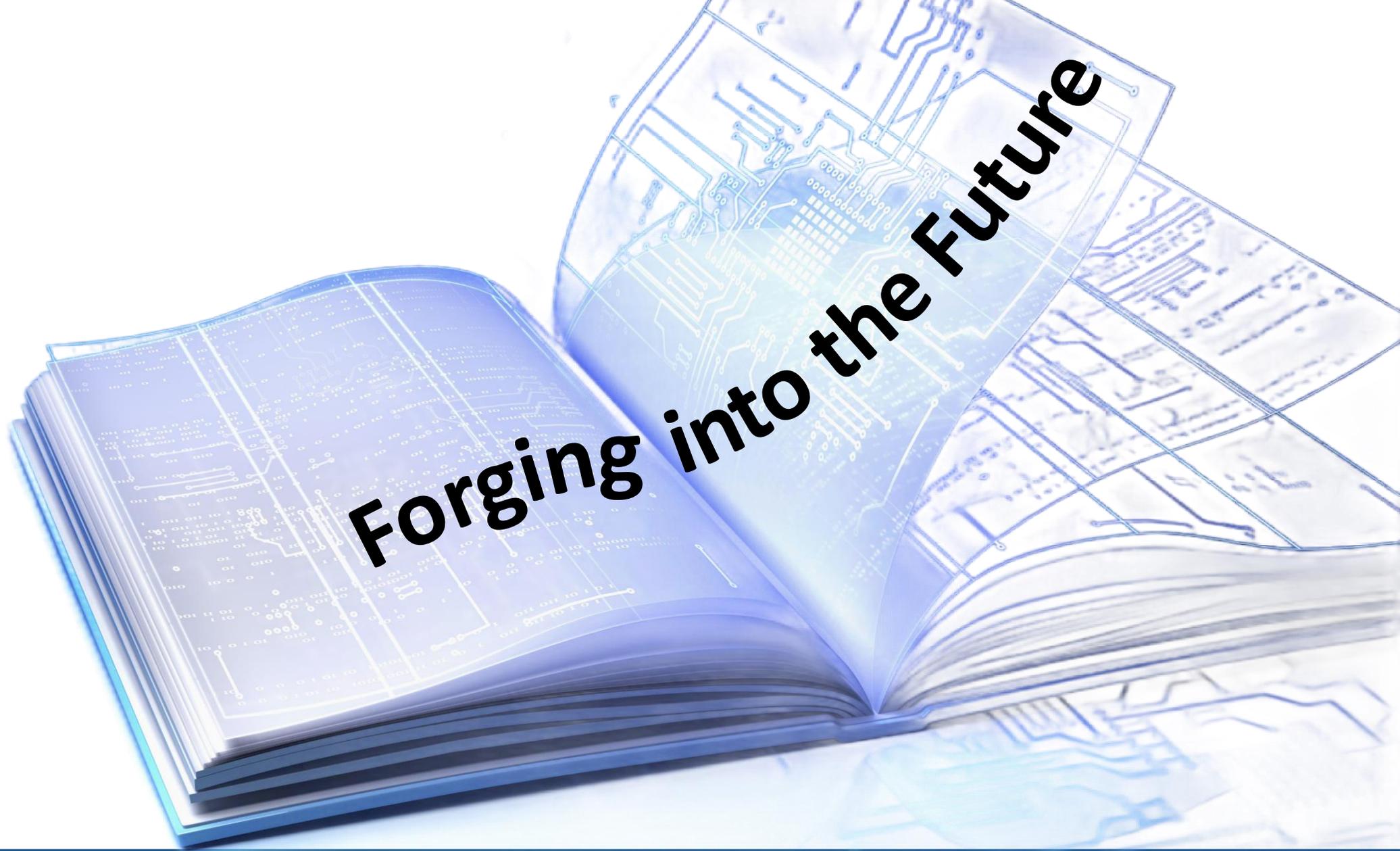


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What percentage of respondents indicated that NLM Office Hours sessions have increased their skills in using a specific NLM resource?

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Forging into the Future



National Library of Medicine
Library Operations



How We are Forging into the Evolving Landscape

- Digital NIH
- Open Science in Action across NIH
- NIH Data Management & Sharing Policy
- OSTP Memo on Public Access Policy & NLM Experience

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Have scientists submitted sequences from dinosaurs to NLM databases?

ⓘ Start presenting to display the poll results on this slide.



AI & NLM

Machine Learning Use Case



GPT Defined

(Generative Pretrained Transformer)



- **Chatbot** is a tool “[d]riven by [artificial intelligence], automated rules, natural-language processing (NLP), and machine learning (ML)...[to] *process data to deliver responses to requests of all kinds.*” Artificial intelligence (AI) “broadly refers to the idea of computers that can learn and make decisions in a *human-like way.*” <https://wame.org/>
- **Generative AI** *creates something completely new* - data, images, sounds, or other types of information - similar or related to the training data.
- **Large Language Model (LLM)** can *recognize, summarize, translate, predict and generate* text and other content based on knowledge gained from massive datasets. A **multimodal LLM** means it can respond to both text and images.



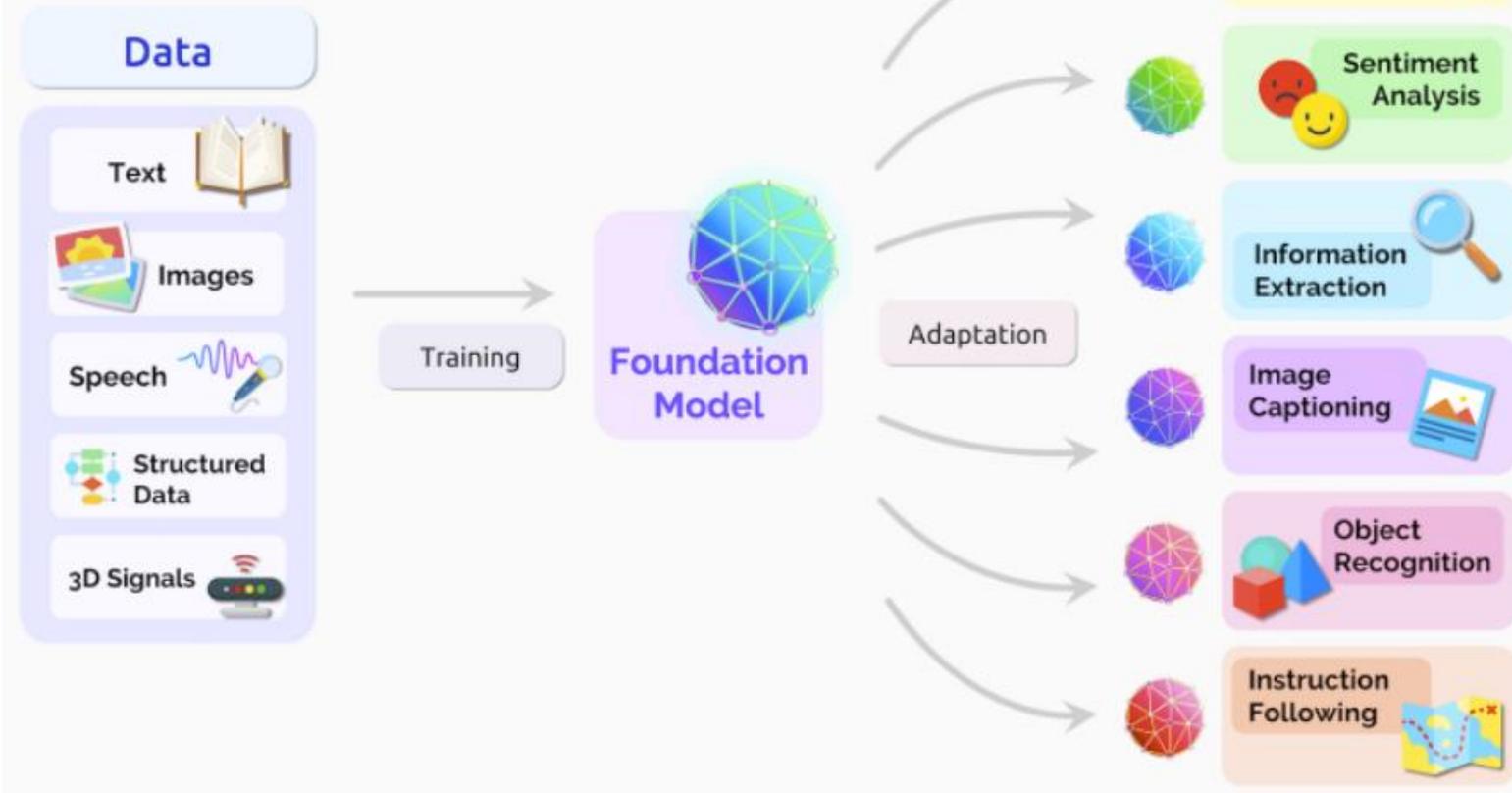
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What types of information can be entered into Generative AI model? Choose all that apply.

ⓘ Start presenting to display the poll results on this slide.

A New Era of Models



Know Before You Go: Content entered in chatbots, including personal information, are used to improve model performance, unless users opt out. Examples: [Privacy Policy](#) and [Terms of Use](#)

Popular Chatbots Used Today (and Growing)

 **OpenAI**  **Writesonic**  **Microsoft**  **BLOOMai**

 **tabnine** **neeva**  **Perplexity**  **DeepMind** 

 **Google AI**  **DeepL**  **Replika**  **YOU.com**  **Otter.ai**

 **ELSA**  **cogram** **character.ai**  **Quora**  **Meta**

 **NVIDIA**  **Hugging Face**

Generative AI Capabilities in Scientific Landscape

- Analyze large and complex datasets more efficiently
- Identify patterns and trends that may not be visible to the human eye
- Generate new research ideas and hypotheses, potentially leading to new discoveries
- Assist in designing and optimizing experiments
- Facilitate the development of new drugs and materials
- Speed writing and review process by organizing material, generating an initial draft, and assisting with non-English reviews



Generative AI *Limitations* in Scientific Landscape

1. **Accuracy and reliability:** training data used to develop the system is biased, incomplete or not factoring developments and complexities unique to science
2. **Reproducibility:** underlying algorithms are complex and not well-understood
3. **Authorship and attribution:** AI as authors of scientific publications and given credit for their research contributions
4. **Ethical considerations:** issues such as data privacy, bias, accountability, hypotheses or ideas not ethical to pursue
5. **Intellectual property:** training on copyrighted or proprietary data
6. **Cost and accessibility:** researchers and institutions with limited resources; health disparities in scientific publishing
7. **Interpretability:** difficult to validate results by deep learning or generative models



Government Input Regarding AI

EO 13960: Trustworthy Principles of AI

- Published Feb 2019
- Maintaining American Leadership in Artificial Intelligence
- [Read More](#)

EO 14091: AI and Equity

- Published Feb 2023
- Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government
- [Read More](#)

AI Bill of Rights – Core Principles and Case Studies

- Published Oct 2022
- Principles and practices help guide the design, use, and deployment of AI systems to protect the rights of the American public
- [Read More](#)

NIST AI Risk Management Framework

- Published Jan 2023
- Framework to better manage risks and incorporate trustworthiness into AI products, services, and systems
- [Read more](#)

How NLM is thinking about Generative AI

- Efficiencies in production steps/process
- Customize customer service responses
- Process/harmonize large amounts of data
- Complete repetitive / complex tasks
- Provide production edits and predictions



What We are Watching

- Chat GPT listed as an author in articles found in PubMed
- Copyright issues; Intellectual Property
- Publishers and publishing organizations (ICMJE, WAME) defining authors
- Workforce concerns
- Need for policy?



Surgeon General's Framework for Workplace Mental Health and Well-Being

76%

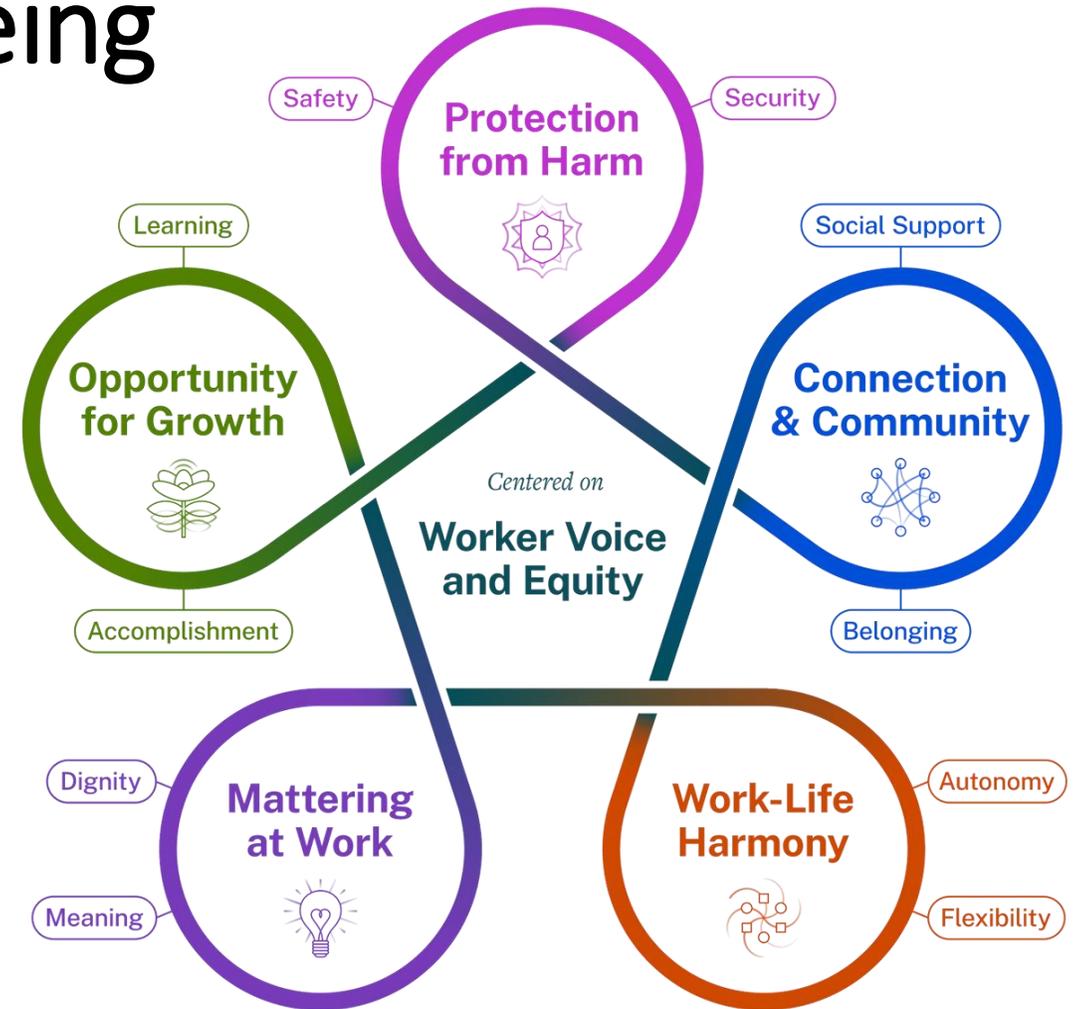
of U.S. workers reported at least one symptom of a mental health condition.

84%

of respondents said their workplace conditions had contributed to at least one mental health challenge.

81%

of workers reported that they will be looking for workplaces that support mental health in the future.





NNLM Updates





Martha Meacham

Project Director,
Network of the National
Library of Medicine

Martha.Meacham@nih.gov



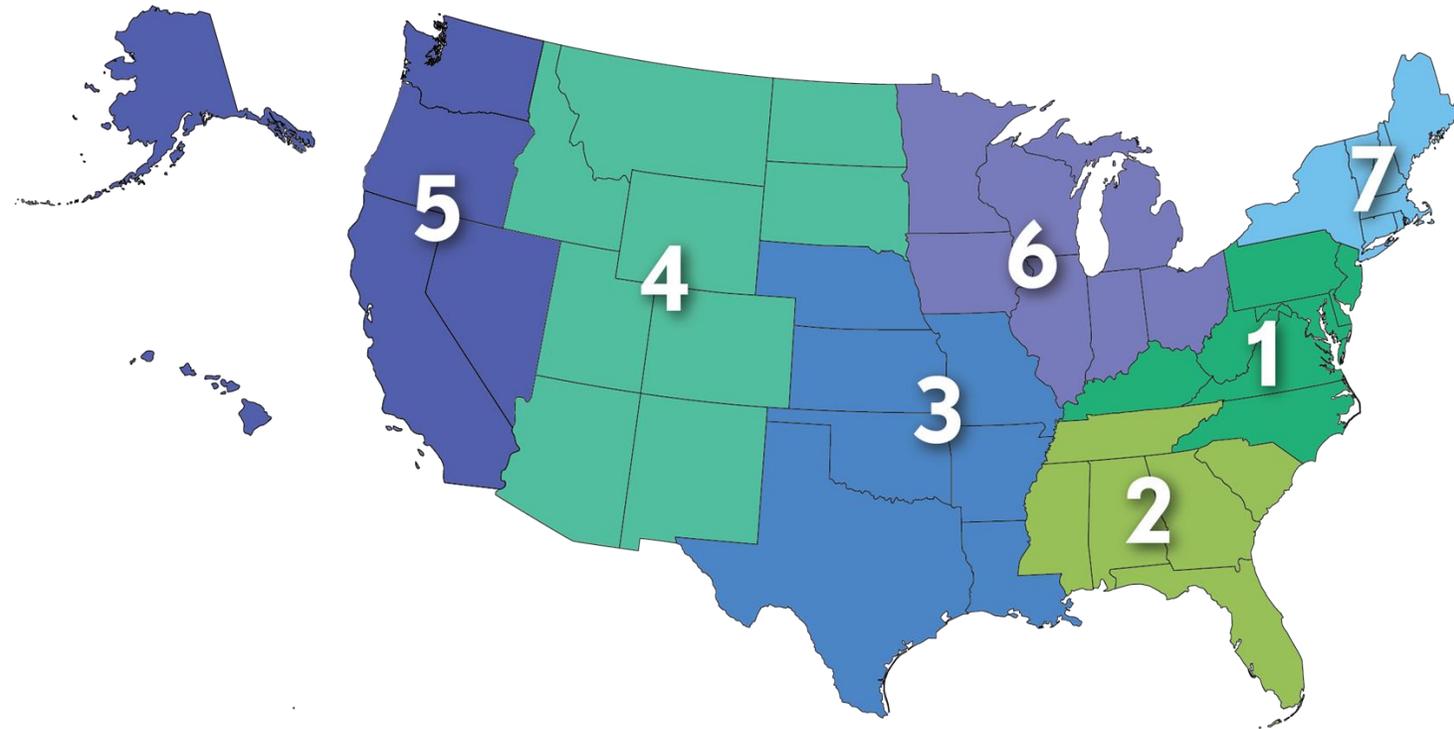
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Network of the National Library of Medicine (NNLM)

Regions



Regional Medical Libraries

Region 1 - University of Maryland, Baltimore

Region 2 - Medical University of South Carolina

Region 3 - University of North Texas Health Science Center

Region 4 - University of Utah

Region 5 - University of Washington

Region 6 - University of Iowa

Region 7 - University of Massachusetts Medical School

Coordinating Offices / Centers

NNLM Public Health Coordination Office (NPHCO)

NNLM Evaluation Center (NEC)

NNLM Web Services Office (NWSO)

NNLM Center for Data Services (NCDS)

NNLM Training Office (NTO)

NNLM *All of Us* Program Center (NAPC)

Feedback and Communication

NNLM serves a primary link to NLM

Multi-directional communications

We want to hear and learn from you

NNLM Staff Directory - <https://www.nlm.gov/about/staff-directory>

NLM – Write the Help Desk - <https://support.nlm.nih.gov/>



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How much funding did NNLM award to community projects last year?

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NNLM Numbers

Training

10/2021–9/2022

- 201 classes
- 19,324 registered

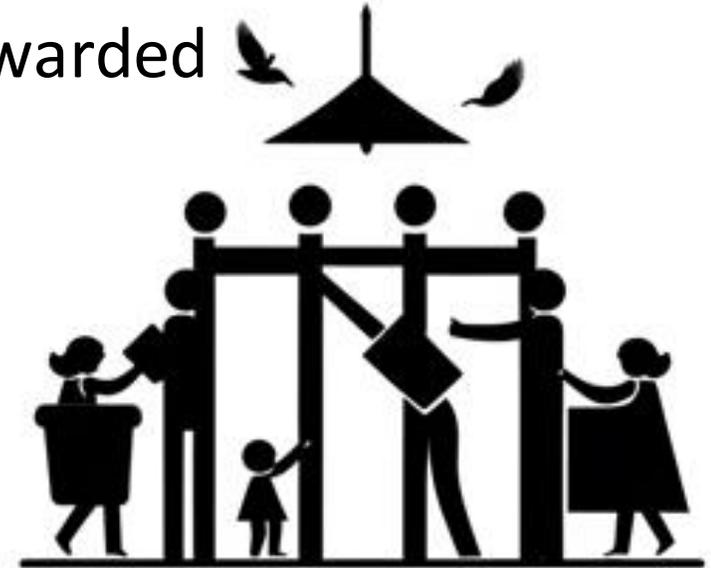
01/2023–03/2023

- 32 classes
- 2,451 participants

Funding

2022 – 2023

- 145 Projects
- \$1,332,865 awarded



Student Engagement

<https://www.nlm.gov/initiatives/student-engagement>

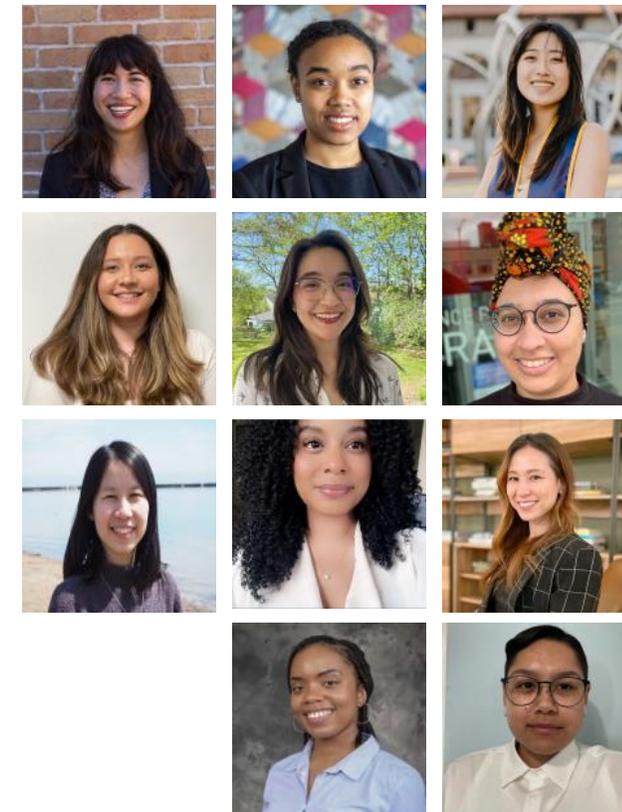
- Internships
- Professional Development
- Alternative Spring Break
- Work with LIS/iSchool Instructors
- LIS Students receiving CHIS

NCDS Data Internship

2022



2023



<https://news.nlm.gov/ncds/internship-announcement-2022/>

<https://news.nlm.gov/ncds/internship-announcement-2023/>

Activities

- **Traveling Exhibitions**
- **Misinformation**
- **Telehealth**
- **Citizen Science**
- **#CiteNLM Wikipedia Edit-a-thon**
- ***All of Us* Partnership**
- **New populations**
- **And so much more!**



Supporting NIH Priorities

NIH Data Management and Sharing Policy (DMSP) Support

- Webinars
- Community Discussions
- Pre-built Classes
- NIH Data Management and Sharing Policy Overview (1 hour) - Twice annually (Fall and Spring)
- Creating Data Management Plans with DMPTool (1 hour) - Twice annually (Fall and Spring)
- NIH DMSP Immersion Workshop (6 hours) - Developing into an On Demand course

NNLM Toolkit for the NIH Data Management and Sharing Policy

<https://www.nlm.nih.gov/guides/nlm-toolkit-nih-data-management-and-sharing-policy>

Learning More

- ✓ **Fundamentals of Health Sciences Research Data Management**
- ✓ **Fundamentals of Health Data Science**
- ✓ **NNLM Carpentries Workshops**
- ✓ **Ethical Considerations of Data: A Curriculum for Health Sciences Librarians (In-Development)**
- ✓ **Inclusion and Accessibility in the Data Age: A Short Course**

Webinars

- **The Research Data Services Landscape: How Do You Start And Where Does Your Library Fit In?**
- **NIH Data Management and Sharing Policy Overview**
- **Introduction to DMPTool**



NNLM National Evaluation Center (NEC)

Galter Health Sciences Library and Learning Center, Northwestern University, Feinberg School of Medicine in Chicago



Dr. Kristi Holmes

Director of NEC

kristi.holmes@northwestern.edu



Verónica Hoyo, PhD

Executive Director of NEC

veronica.hoyo@northwestern.edu

NEC provides innovative evaluation frameworks and evidence-based evaluation tools and practices for NNLM & those it serves.

- ✓ Data Requests (MLA Legislative Task Force)
- ✓ Data Visualization Challenge
- ✓ Membership Survey

Standardized Survey Instruments

- ✓ Training Survey (with 12-month follow-up)
- ✓ Participant Activity Survey
- ✓ Grant Score Cards

NNLM Discovery Podcast



Thank You!

www.NNLM.gov

Martha Meacham

Martha.Meacham@nih.gov



National Library of Medicine
Network of the National Library of Medicine



Stay connected!



Discussion

From you to NLM:

1. Any thoughts on our goals over the next 13 years as we look to our 200th anniversary?
2. How do you see yourself/your work in our vision and roadmap for the 3rd century?
3. Any ideas for leveraging Generative AI in your work?
4. The NLM Update has been a tradition at this conference. As we continue on our roadmap with our partners, what can we do to make our time together more beneficial?



Resources

- LO Long Range Plan for 2036 <https://www.nlm.nih.gov/lo/index.html>
- MeSH Update Overview: <https://datadiscovery.nlm.nih.gov/stories/s/MeSH-2023-Update-Overview/4ekx-rduw/>
- NIH Data Sharing Policy <https://sharing.nih.gov/>
- NLM meetings & events open to the public <https://videocast.nih.gov/>
- NLM Support Center <https://support.nlm.nih.gov/>
- NLM Technical Bulletin <https://www.nlm.nih.gov/pubs/techbull/about.html>
- NNLM Discovery podcast <https://www.nnlm.gov/podcast>
- NNLM Evaluation Center contact nec@northwestern.edu
- NNLM Center for Data Services <https://www.nnlm.gov/about/centers/ncds>
- Surgeon General's Workplace Mental Health and Well-Being Framework: <https://www.hhs.gov/surgeongeneral/priorities/workplace-well-being/index.html>
- What's New in MeSH: <https://www.nlm.nih.gov/mesh/whatsnew.html>



Building on our Vision & Roadmap for the 3rd Century

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